A reliable fistula closure technique for refractory pneumothorax unresponsive to pleurodesis.

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Case report

A reliable fistula closure technique for refractory pneumothorax unresponsive to pleurodesis

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ABSTRACT

An 86-year-old man, who had undergone pleurodesis several times for intractable pneumothorax due to severe emphysema was referred to our department in order to treat for recurrent pneumothorax. Computed tomography after chest tube drainage revealed incomplete re-expansion right lung and giant cyst. Because the air leakage continued, we performed surgery.

Thoracotomy revealed extensive intrathoracic adhesions due to chemical pleurodesis with OK-432.

There was a fistula at the base of the giant cyst in the upper right lobe, which was firmly adhered to the superior vena cava and other mediastinal organs. It was not feasible to staple the lesion cyst, and covering the fistula was ineffective. Therefore, we tried to suture the fragile bulla manually to close the fistula. Adhesion was peeled off carefully to relieve tension of the bulla from mediastinum. The thin wall was folded and reinforced with polytetrafluoroethylene pledget, and then this thickened tissue was sutured to the lung with U-stitches to close the fistula. After the operation, pneumothorax improved. He was discharged without complications.

1. Introduction

Most refractory pneumothoraxes that require surgical treatment are secondary pneumothorax due to underlying disorders such as severe emphysema and interstitial pneumonia. These patients may have already undergone multiple conservative treatments and are often not eligible for simple bulla excision using an automatic suture device. Pleurodesis is commonly used as a conservative treatment, and various formulations have been reported [1,2]. OK-432 is most often used in Japan, but it causes forced adhesions into the thoracic cavity and, if the result is incomplete, makes subsequent surgery even more difficult [3]. Here, we reported a case of elderly patient with refractory pneumothorax who had a clinical course as a result of effective surgical procedures.

2. Case presentation

An 86-year-old man, who had undergone pleurodesis several times for secondary pneumothorax due to severe emphysema was referred to our department in order to treat for recurrent pneumothorax. A thoracic tube was inserted, and computed tomography revealed incomplete re-expansion right lung and giant cyst (Fig. 1). He requested conservative treatment because of his chronic heart failure and respiratory failure enough to receive home oxygen therapy (3L/min). Thus, he was received chemical pleurodesis with OK-432 on the 3rd and 12th hospital days. The air leak before treatment was only during exhalation, but after treatment it worsened to continuous air leak corresponding to Grade 3 [4]. His percutaneous oxygen saturation during exertion dropped below 90% (O2 3L/min) and his respiratory status worsened. On the 28th hospital days, he was given informed consent and surgical treatment was performed.

Thoracotomy revealed intrathoracic extensive adhesion, resulting from chemical pleurodesis. Lung bulla in the right upper lobe was strongly adhered to the mediastinum, and a fistula was observed at the base of the lesion (Fig. 2a). Stapling the bulla was infeasible and covering the fistula with fibrinogen-blended tissue adhesive was ineffective. Therefore, we attempted to suture the fistula directly after slightly stripping the surrounding tissue. The bulla was fragile and could be torn by needle, so we folded the thin wall to make it thicker (Fig. 2b) and reinforced with a polytetrafluoroethylene (PTFE) pledget. First, this thickened tissue was sutured with a single U-suture (polypropylene 4-0) (Fig. 3a). Next, we added U-stitches over the PTFE pledget to close the fistula (Fig. 3b), and resulted in repairing the bulla (Fig. 3c). After the operation, the pneumothorax improved and air leak was stopped

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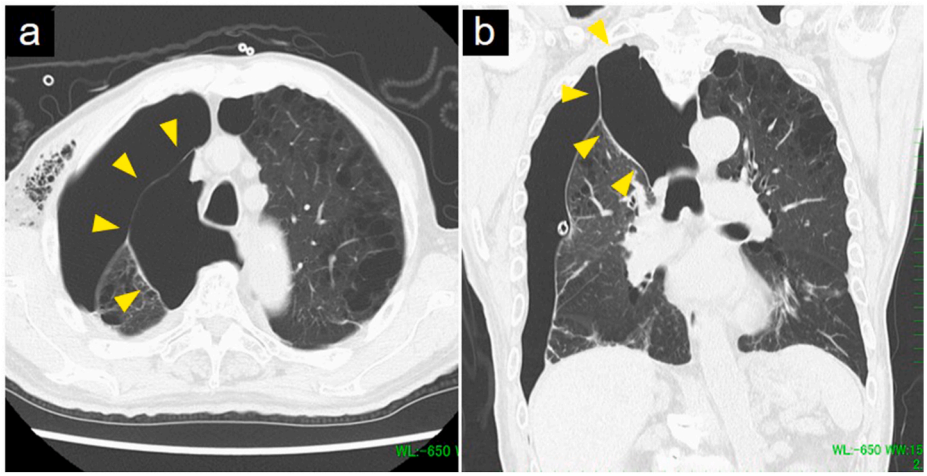

Fig. 1. Chest computed tomography showed a giant bulla of the right upper lobe (yellow allows). It was suspected of widespread adhesion to the mediastinum of the intrathoracic by axial (a) and coronal (b) views as CT findings. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

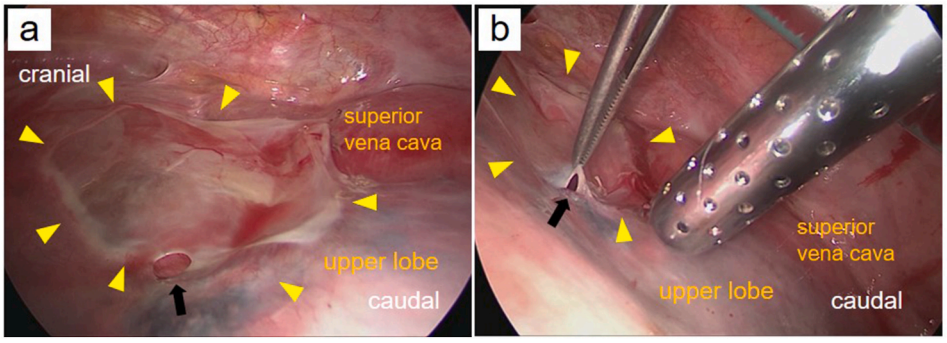

Fig. 2. Intraoperative findings revealed an extensively adherent thin-walled cyst (yellow allows) and a fistula (black allow) in the base of the bulla. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

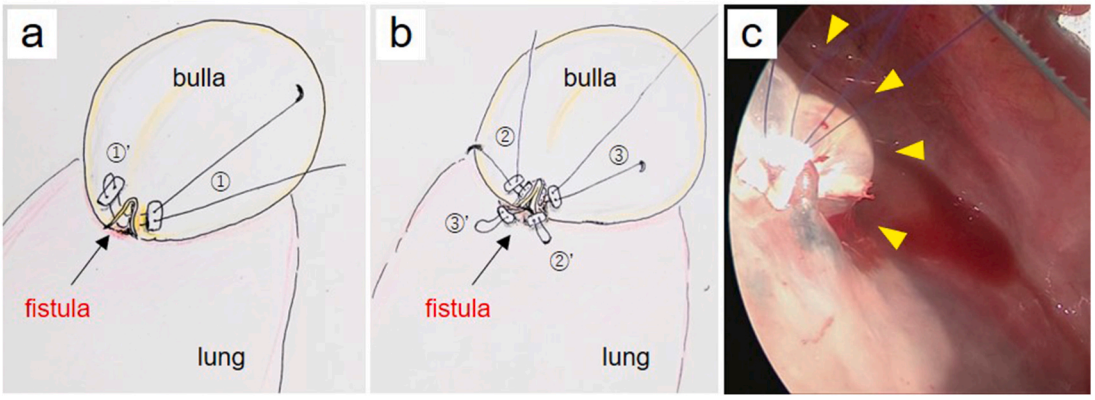

Fig. 3. Schema of the operative field: the thin-wall was folded and reinforced with a pledget (a), and then this flap was sutured to the lung parenchyma with U-stitches to close the fistula (b). Air leak stopped and the bulla was inflated (c).

(Grade0). The chest tube was removed postoperative 2 days. After rehabilitation, he was discharged on the postoperative 41 days without complications.

3. Discussion

Several methods have been reported for the surgical treatment of refractory unresectable pulmonary fistulas [5], and the procedure is applied according to the existing lung condition. Covering the bulla with fibrin glue and polyglycolic acid (PGA) sheet is a commonly used method.

In this case, chemical inflammation caused by OK-432 degenerated the surface of the bulla and pulmonary pleura and could not be applied. The fibrinogen-blended tissue adhesive used instead also fell off immediately. Patch closure of fistula with fat tissue is a method performing for poorly compliant lungs. However, the mediastinal and pericardial

adipose tissue degeneration caused by OK-432 was severe, and the subcutaneous fat of this elderly patient was low, so that the tissue could not be secured. PTFE pledget is mainly used for prosthesis of ventricular myocardium defects and reinforcement of suture sites during cardiac surgery [6], and is also useful for reinforcement of fragile tissues such as bulla of chronic emphysema. Pleurodesis with OK-432 causes restrictive damage to the lungs and mediastinal organs, making subsequent intrathoracic procedures extremely difficult and should be carefully selected as a treatment [7]. Although bronchoscopic treatment has been reported in recent years [8], filling the dilated upper lobe bronchus with spigot is not easy and may not be universal to the patient. Surgical treatment may be required as a means of combined treatment for refractory pneumothorax, in which case the methods reported here are useful for patients who do not respond to multiple treatments.

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Declaration of competing interest

Conflict of interest statement: the authors have no competing interests.

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